PATENT SPECIFICATION (11) 1 458 362

1 458 362

(21) Application No. 15953/75 (22) Filed 5 Jan. 1973
(62) Divided out of No. 1 458 361
(23) Complete Specification filed 20 Dec. 1973
(44) Complete Specification published 15 Dec. 1976
(51) INT. CL.² F16D 65/56//55/24 65/04 65/16
(52) Index at acceptance
F2E 1A1A2 1A1B 1A1E 1A2E 1A2F 2K 2N1A11A 2N1A11B 2N1A2 2N1A3 2N1A5 2N1C3 2N1D14 2N1D16 2N1D2A 2N1D2B 2N1D2D 2N1D8B 2N1D9 2N1K1 3B 3C1 3D 3F D24

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(19)

(54) IMPROVEMENTS IN OR RELATING TO BRAKES

(71) We, GIRLING LIMITED, a British Company, of Kings Road, Tyseley, Birmingham 11, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to brakes.

In accordance with the invention there is provided a brake comprising a body of friction material for engagement with a rotor, and adjusting means for adjusting the position of the friction material relative to the rotor to compensate for wear of the friction material, the adjusting means comprising an elongate screw threaded member which extends at least partially alongside the body of friction material, a nut member co-operating with the friction material and movable along a portion of the screw threaded member to adjust the position of the friction material, and destructible thread protecting means surrounding the portion of the screw thread along which the nut member moves during adjustment.

One form of railway vehicle brake in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings in which:—

Figure 1 is an axial cross-section, on the line BB of Figure 2;

Figure 2 is an axial section on the line CC of Figure 1;

Figure 3 is a part section on the line AA in Figure 2;

Figure 4 is a cross-section on the line DD of Figure 2;

Figure 5 is a cross-section on the line EE of Figure 2;

Figure 6 is a section on the line FF of Figure 2; and

Figure 7 is a section on the line GG of Figure 2.

The brake construction illustrated comprises a main casing 1 shown here as of integral construction but which may alternatively be made in separate axial sections. The casing extends substantially the full length of an axle, terminating close to the inner faces of the wheels 7; the inner faces of which act as braking surfaces. The casing 1 is supported against drag forces generated during braking, but has a degree of axial or "end" float to accommodate wheel set end float.

The brake pads of the brake are constituted by elongated members 2 of friction material which are supported in slots 3 in the casing for movement axially thereof and project through apertures 6 at the adjacent outer end wall of the casing, close to the braking surfaces of the adjacent wheel. In use, the elongated members 2 are forced outwardly of the casing into braking engagement with the wheel 7, the drag forces being transmitted to the side edges 5 of apertures 6 and thus to the casing, so that only a short unsupported length of each member 2 is subjected to bending due to the drag forces.

The inner end of each member 2 is supported by a metal cap 8, preferably having a pre-stressed resilient means, such as a pair of belleville washers 11 through which braking forces are transmitted to the cap 8 and member 2 by a beam 9 which acts on all of the caps 8. The resilient means 11 serve to equalise or compensate the forces transmitted by the beam 9 to the caps 8 and friction members 2. The beam 9 is keyed against rotation by engagement in the axial slots 3, and is in the form of a nut member screwed on to an adjuster screw 10. A portion of screw 10 extends through a protective guide tube or sleeve 19 which is connected to the beam 9. The outer end of the screw 10 carries a sealed piston 20 which prevents the ingress of

dirt. The tube 19 is of destructible material, for example friction material, which is progressively worn away by abrasion from the wheel 7, as wear of the members 2 occurs and is compensated in a manner to be described in detail below. The end of sleeve 19 adjacent the rotor is laterally supported against drag forces.

The inner end of the screw 10 is journalled into a blind bore in the adjacent end of a roller-tappet of a wedge-expander 12, located at the mid-point of the casing 1, i.e. approximately on the longitudinal centre-line of the vehicle. The other roller-tappet of the expander acts on a corresponding screw 10 (not shown) for the other wheel 7 of the wheel set.

Actuation of the wedge expander causes both tappets to move outwardly and to act on the respective screws 10, beams 9 and friction members 2, the outer ends of which are thus applied to the inner, braking surfaces of the wheels 7.

Although a highly wear resistant material is preferably employed for the members 2, they will, of course, wear progressively, and this wear must be compensated. Accordingly, there is provided an automatic slack-adjuster, best illustrated in Figures 2, 6 and 7, comprising a pawl 13 carried by the actuator wedge, co-operating with a ratchet wheel 14 mounted on a spindle 15, the outer ends of which are provided with or formed as pinions meshing with gear wheels 18 carried by the respective adjuster screws 10. These screws are of opposite hand so that rotation of the spindle 15 in one direction will effect movement in opposite directions of the respective beams 9.

The pawl becomes effective to rotate the ratchet on any actuating stroke of the wedge in excess of the distance X (Figure 7) by one tooth pitch of the ratchet wheel, reverse rotation of the ratchet being prevented by a stop pawl 16. The distance X is calculated to allow for normal brake clearances, lost motion and structural deflection.

Suitable provision is made, in any convenient known manner, for protecting the slack adjuster components against excessive operating loads, such as resilient means for storing energy to effect adjustment on the return stroke (rather than the actuating stroke), or a frictional clutch means which slips under excessive loads.

Figure 2 illustrates, at 9A, the position of beam 9 in the "fully worn" condition of the friction members 2, the end of the casing serving to protect the wheel 7 from damage by any components within the casing.

In the arrangement illustrated, each of the friction members 2 is arranged to engage the whole swept path of the braking surface of wheel 7. Nevertheless, the operative area of each friction member is small so that the problems created by localised high spots is greatly reduced. The volume of the friction material is large, to provide a good wear volume and yet the stresses set up by drag forces are contained within acceptable limits by support of the members close to the braking surface.

The problem of localised high-spots can be mitigated still further, if desired, by employing a larger number of individual friction members, some of which engage an inner annular zone of the swept area while the rest engage an outer annular zone.

Advantages also accrue from using the wheel as the brake rotor by virtue of the large heat sink effect of the wheel, and the large swept area which is obtainable near the rim of the wheel.

Installation of a brake construction as described above presents no special problems. The brake is readily adapted for mounting on standardised bogies, either using the normal mounting slots or existing, alternative brake hanger points.

Another advantage of the construction resides in the fact that, since the friction members are of small cross-section, the heat curing of the organic materials used in the members is greatly facilitated.

Having regard to the provisions of Section 9 of the Patents Act attention is directed to our co-pending U.K. Patent Application No. 852/73 (Serial No. 1 458 361).

WHAT WE CLAIM IS:—

1. A brake comprising an elongate body of friction material for engagement with a rotor, and adjusting means for adjusting the position of the body of friction material relative to the rotor to compensate for wear of the friction material, the adjusting means comprising an elongate screw threaded member which extends at least partially alongside the body of friction material, a nut member co-operating with the friction material and movable along a portion of the screw threaded member to adjust the position of the friction material, and destructible thread protecting means surrounding the portion of the screw thread along which the nut member moves during adjustment.

2. A brake according to claim 1, wherein said thread protecting means is engageable with and progressively worn away by the rotor.

3. A brake according to claim 2, wherein the thread protecting means comprises a sleeve surrounding the portion of the screw threaded member, said sleeve having one of its ends engageable with the rotor and the other of its ends connected

to nut member.

4. A brake according to claim 3, wherein the end of said sleeve adjacent the rotor is laterally supported against drag forces.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1976.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1 458 362
3 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

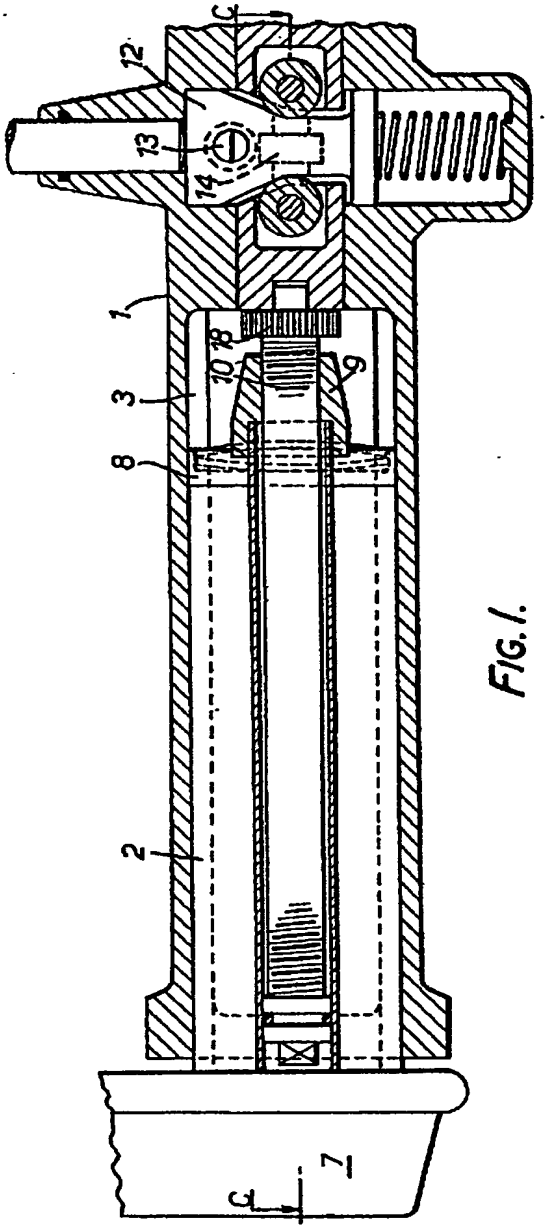

FIG. 1.

1 458 362 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 2

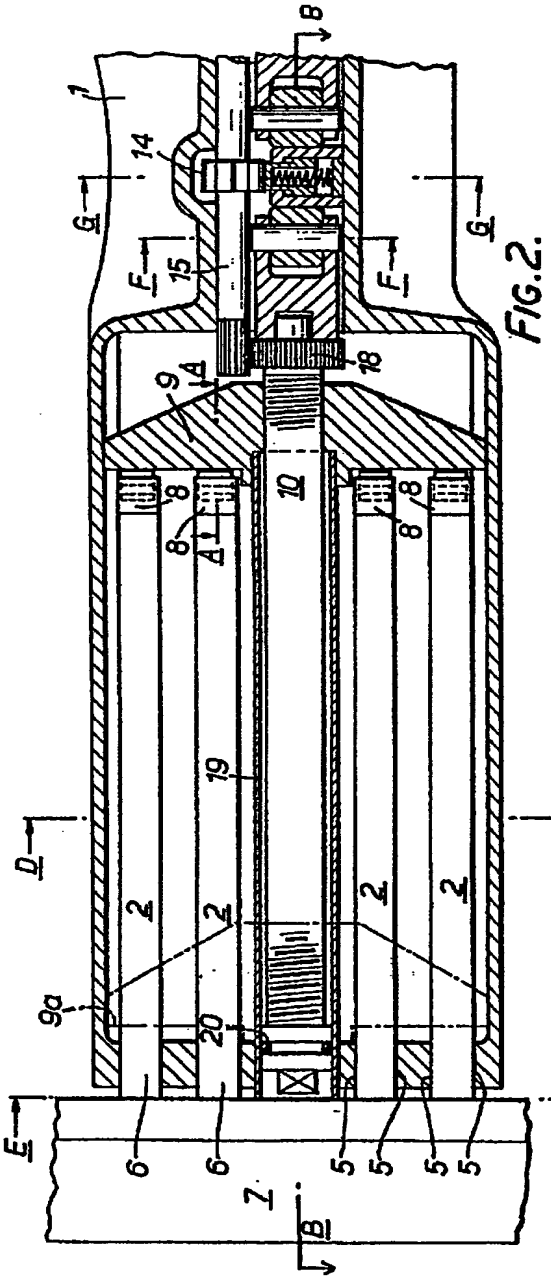

FIG.2.

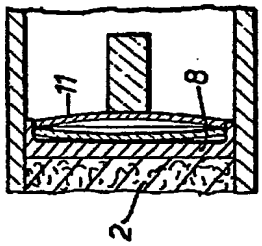

FIG.3.

1 458 362 COMPLETE SPECIFICATION
3 SHEETS

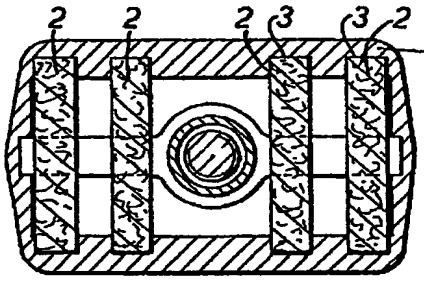

FIG.4.

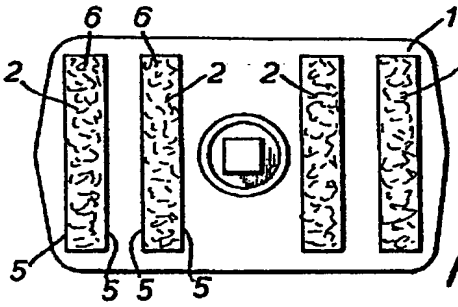

FIG. 5.

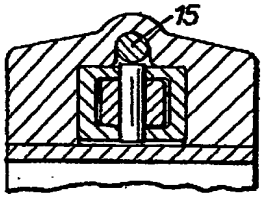

FIG.6.

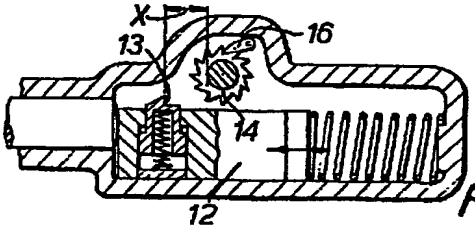

FIG. 7.

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